

**C L A I M S**

We Claim:

- 1     1.     A synthesizer for forming a polymer chain by sequentially adding monomer units  
2     found in one of a plurality of reagent solutions, the synthesizer comprising:  
3         a.     a first vial and a second vial, wherein the first vial and the second vial are  
4                 configured for holding the plurality of reagent solutions;  
5         b.     means for dispensing configured for dispensing the plurality of reagent  
6                 solutions into the first and second vials; and  
7         c.     means for selectively expelling material from the first and second vials,  
8                 configured for coupling to the first and second vials and purging material from  
9                 a selective one of the first vial and the second vial.
- 1     2.     The synthesizer according to claim 1 further comprising a cartridge configured for  
2     holding the first vial and the second vial.
- 1     3.     The synthesizer according to claim 2 wherein the cartridge holds the first vial and the  
2     second vial along a circular perimeter of the cartridge.
- 1     4.     The synthesizer according to claim 3 further comprising a motor coupled to the  
2     cartridge configured for selectively rotating the cartridge relative to the means for sequentially  
3     dispensing.
- 1     5.     The synthesizer according to claim 4 further comprising a drain plate coupled to the  
2     cartridge for separating the first vial into a first bank of vials and the second vial into a  
3     second bank of vials.

1     6.     The synthesizer according to claim 1 further comprising a chamber bowl coupled to  
2     the means for selectively expelling wherein the chamber bowl contains any spilled material.

1     7.     The synthesizer according to claim 6 further comprising a seal coupled to the chamber  
2     bowl to prevent spilled material from escaping outside the chamber bowl.

1     8.     The synthesizer according to claim 1 wherein the means for selectively expelling  
2     further comprises:

- 3             a.     means for forming a pressure differential between a first opening and a second  
4             opening of the selective one of the first vial and the second vial; and  
5             b.     a waste tube to collect material expelled from the selective one of the first vial  
6             and the second vial.

1     9.     The synthesizer according to claim 1 wherein the means for dispensing further  
2     comprises:

- 3             a.     a plurality of valves for controlling dispensing of the plurality of reagent  
4             solutions; and  
5             b.     a plurality of dispense lines wherein each of the plurality of the dispense lines  
6             is coupled to a corresponding one of the plurality of valves for delivering one  
7             of the plurality of reagent solutions to a selected vial.

1     10.    The synthesizer according to claim 1 wherein each of the first vial and the second vial  
2     further comprise a precision bored interior configured to hold a frit for retaining a solid  
3     material above the frit, and further wherein the first vial and the second vial are configured to  
4     maintain a consistent flow through the precision bored interior.

- 1 11. A synthesizer for forming a polymer chain by sequentially adding monomer units  
2 found in a plurality of reagent solutions, the synthesizer comprising:
- 3 a. a first vial configured to hold the plurality of reagent solutions;  
4 b. a second vial configured to hold the plurality of reagent solutions;  
5 c. a cartridge to hold the first vial and the second vial;  
6 d. a dispensing system to dispense the plurality of reagent solutions into the first  
7 and second vials; and  
8 e. a purging system to remove material from a selective one of the first vial and  
9 the second vial.
- 1 12. The synthesizer according to claim 11 wherein the cartridge holds the first vial and the  
2 second vial along a circular perimeter of the cartridge.
- 1 13. The synthesizer according to claim 11 further comprising a chamber bowl coupled to  
2 the purging system wherein the chamber bowl contains spilled material.
- 1 14. The synthesizer according to claim 13 further comprising a seal coupled to the  
2 chamber bowl to prevent spilled material from escaping outside the chamber bowl.
- 1 15. The synthesizer according to claim 11 wherein the purging system further comprises:  
2 a. means for forming a pressure differential between a first opening and a second  
3 opening of the selective one of the first vial and the second vial; and  
4 b. a waste tube to collect material expelled from the selective one of the first vial  
5 and the second vial.

1     16.     The synthesizer according to claim 11 wherein the dispensing system further  
2 comprises:

- 3           a.     a plurality of valves for controlling dispensing of the plurality of reagent  
4                 solutions; and  
5           b.     a plurality of dispense lines each coupled to one of the plurality of valves for  
6                 delivering a corresponding one of the reagent solutions to a selected vial.

1     17.     The synthesizer according to claim 11 wherein each of the first vial and the second  
2 vial further comprise a precision bored interior configured to hold a frit for retaining a solid  
3 material above the frit, and further wherein the first vial and the second vial are configured to  
4 maintain a consistent flow through the precision bored interior.

1     18.     The synthesizer according to claim 11 further comprising a drain plate coupled to the  
2 cartridge for separating the first vial into a first bank of vials and the second vial into a  
3 second bank of vials.

1     19.     The synthesizer according to claim 11 further comprising a motor coupled to the  
2 cartridge to selectively rotate the cartridge relative to the dispensing system.

1     20.     A synthesizer for creating a polymer chain by sequentially adding monomer units  
2 found in one of a plurality of reagent solutions, the synthesizer comprising:

- 3           a.     a plurality of vials wherein each of the plurality of vials is configured to hold  
4                 material including the plurality of reagent solutions;

- 5           b.     a cartridge for holding the plurality of vials and dividing the plurality of vials  
6                   into a first bank of vials including at least one of the plurality of vials and a  
7                   second bank of vials including at least one of the plurality of vials;  
8           c.     a dispensing system configured to sequentially dispense selective ones of the  
9                   plurality of reagent solutions into the plurality of vials; and  
10          d.     a purging system configured to selectively purge material from the first bank of  
11                vials and the second bank of vials.

12 21.     The synthesizer according to claim 20 further comprising a first drain coupled to the  
13 first bank of vials and a second drain coupled to the second bank of vials, the first and second  
14 drains each configured for selectively coupling with the purging system for draining the first  
15 bank of vials and the second bank of vials.

16 22.     The synthesizer according to claim 21 wherein the purging system further comprises a  
17 waste tube capable of selectively coupling with a selective one of the first drain and the  
18 second drain to purge material from the first bank of vials and the second bank of vials.

19 23.     The synthesizer according to claim 20 wherein the dispensing system further  
20 comprises:

- 21           a.     a plurality of valves for controlling the dispensing of the plurality of reagent  
22                   solutions; and  
23           b.     a plurality of dispense lines each coupled to one of the plurality of valves for  
24                   delivering a corresponding one of the plurality of reagent solutions to a selected  
25                   vial.

1     24.     A purging system configured for use with a synthesizer containing a first bank of vials  
2     and a second bank of vials wherein the first bank of vials has a first drain and the second  
3     bank of vials has a second drain, the purging system comprising:

- 4             a.     a pressurizing system for creating a pressure differential within a selective one  
5                     of the first bank of vials and the second bank of vials; and  
6             b.     a first waste tube capable of coupling with a selective one of the first drain to  
7                     purge material from the first bank of vials and the second drain to purge  
8                     material from the second bank of vials.

1     25.     The purging system according to claim 24 further comprising a drain seal coupled to  
2     the first waste tube for creating a flexible seal between the first waste tube and the selective  
3     one of the first drain and the second drain.

1     26.     The purging system according to claim 24 further comprising a second waste tube  
2     capable of selectively coupling with the first drain to purge the material from the first bank of  
3     vials and the second drain to purge the material from the second bank of vials wherein the  
4     purging system is capable of selectively and simultaneously purging the first bank of vials and  
5     the second bank of vials.

1     27.     A vial comprising a precision bored interior configured to hold a frit for retaining  
2     material within the vial above the frit and maintain a consistent flow through the precision  
3     bored interior during a flushing procedure.

1     28.     The vial according to claim 27 further comprising an exterior dimension configured to  
2     fit within a receiving hole of a cartridge, thereby providing a pressure-tight seal between the  
3     vial and the cartridge.

1 29. A vial comprising an exterior dimension configured to fit within a receiving hole of a  
2 cartridge thereby providing a pressure-tight seal between the vial and the cartridge and a  
3 precision bored interior to maintain a consistent flow through the precision bored interior  
4 during a flushing procedure.

1 30. The vial according to claim 29 further comprising a frit positioned within the precision  
2 bored interior to retain material within the vial above the frit.

1 31. A method of selectively and sequentially dispensing a plurality of reagent solutions to  
2 a plurality of vials divided into a first bank of vials and a second bank of vials and selectively  
3 purging material from the first bank of vials and the second bank of vials, comprising the  
4 steps of:

- 5 a. dispensing one or more of the plurality of reagent solutions to a selective one  
6 or more of the plurality of vials; and
- 7 b. purging material from a selective one of the first bank of vials and the second  
8 bank of vials.

1 32. The method according to claim 31 wherein during the step of dispensing one of the  
2 plurality of reagent solutions is dispensed into one or more of the plurality of vials in a  
3 parallel fashion.

1 33. The method according to claim 31 wherein during the step of dispensing one or more  
2 of the plurality of reagent solutions are dispensed into one or more of the plurality of vials in  
3 a serial fashion.

- 1     34.     A method of selectively purging material from a selective one of a first vial and a  
2     second vial comprising the steps of:
- 3           a.     coupling a waste tube to a selective one of a first drain corresponding to the  
4           first vial and a second drain corresponding to the second vial; and
- 5           b.     forming a pressure differential between an interior and an exterior of the  
6           selective one of the first vial and the second vial, thereby expelling material  
7           from the selective one of the first vial and the second vial through the waste  
8           tube.